coronary intervention (PCI). There is limited data on the safety and efficacy of BVS in contemporary clinical registries. We evaluated the safety and efficacy of BVS in our unselected South-east Asian patients and report on the clinical outcomes.
Methods: Between May 2012 to October 2013, 79 patients (83.5 % male, mean age 52 ± 10 years) with 83 coronary lesions were treated with a total of 116 BVS. The primary endpoint was in-hospital major adverse cardiac events (MACE) ie a composite of cardiovascular death, target vessel related myocardial infarction (MI) and target lesion revascularization (TLR). Secondary endpoints included individual components of MACE and scaffold thrombosis at 6 months follow up.
Results: The majority of patients presented with acute coronary syndrome (50.6 %). Transradial PCI was performed in 98 % of cases. Intracoronary imaging and cutting balloons were used as adjunctive PCI tool in 46 % and 52 % of cases respectively. The mean number of BVS implanted per patient was 1.4 ± 0.7, mean BVS diameter was 3.1 ± 0.3 mm and total BVS length was 30 ± 19 mm.

BVS was implanted in *de novo* lesions in 95 % of cases with the left anterior descending artery being the most common target vessel (52%). 4 BVS were implanted in non *de novo* lesions (1 saphenous vein graft, 1 left internal mammary artery and 2 instent restenosis).

There was no MACE observed in-hospital. However, there were 2 cases of subacute scaffold thrombosis within 30 days of PCI which required re-intervention. There were no further ischaemic events at 6 months follow-up.
Conclusion: Early experience with BVS in our unselected South-east Asian patients reveals a promising result with a low incidence of ischaemic events. Longer clinical follow-up is necessary to prove its long term efficacy and safety.

TCTAP A-080

Patient-specific Cardiovascular Models for Educational and Training Purposes

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Background: Structural heart defects affect 8 out of 1000 newborns and while a large percentage of these defects have no serious consequences for the child's life, some patients present life-threatening conditions that need to be carefully understood and treated.

Multiple techniques are applied in the manufacturing of heart models used for educational purposes. Nevertheless, these models are often generic representations of the anatomy and do not account for an array of configurations that congenital cases present.

3D printing offers an adaptable and powerful alternative in creating accurate patient-specific models for educational purposes and pre-surgical planning.
Methods: CT and MRI scans of a number of cardiovascular pathologies were obtained. The anatomies were then reconstructed and modified in 3D so that they could be successfully 3D printed. Multiple 3D printing techniques and materials were then utilized to produce physical anatomical representations of the cardiac anatomy, according to the specific needs of each case.
Results: Rigid models of the lumen were obtained for educational and communication purposes, where each cardiac structure was represented in a different color for better understanding of the patient's pathologies.

Flexible, translucent hollow models of the congenital heart defects were 3D printed for the simulation of the intended procedure, aimed at offering better insight to the surgical outcome.
Conclusion: 3D printed patient-specific models of the cardiovascular anatomy from medical image data hold great promise to improving clinical understanding of congenital heart defects, offering physicians superior training and planning possibilities.

Invasive Coronary Imaging: IVUS, OCT, Spectroscopy, and Other (TCTAP A-081 to TCTAP A-086)

TCTAP A-081

Efficacy of the Combination Catheter; Intravascular Ultrasound(IVUS) with a Balloon

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Background: VIBE RX catheter is the world's first catheter that combines intravascular ultrasound (IVUS) with a balloon in one device. We evaluated the efficacy of the novel catheter.
Methods: 50 patients who underwent percutaneous coronary intervention (PCI) in our hospital between July 2012 and October 2012 were enrolled in this study. They were randomly divided into two groups: using IVUS with a balloon (n=25), and using ordinary IVUS (n=25). Patients with distal lesions, chronic total occlusion (CTO) and acute myocardial infarction (AMI) were excluded. We assessed procedure time, fluoroscopy time, contrast volume, the device crossability.
Results: Procedure time were 67.7+-24.7 minutes in VIBE group and 79.1+-23.3 minutes in EagleEye group (p=0.06). Fluoroscopy time were 20.7+-10.5 minutes in VIBE group and 25.5+-11.7 minutes in EagleEye group (p=0.11). Contrast volume were 120.2+-34.8ml in VIBE group and 119.9+-34.1ml in EagleEye group (p=0.81). 3 patients in both groups had difficulties of the device crossability.
Conclusion: Our study suggests that using VIBE RX catheter may contribute to reduce procedure time and fluoroscopy time. Further studies about the economic efficacy and the usefulness for more complex situations are needed.

TCTAP A-082

Optical Frequency Domain Imaging Guidance for Coronary Stent Implantation in Comparison with Intra Ultrasound Guidance

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Background: Intravascular ultrasound (IVUS) has been used as a guidance of stenting. Optical Frequency Domain Imaging (OFDI) has high resolution and superimposed technology on cineangiogram. The aim of this study was to assess the feasibility of OFDI-guided stent implantation.
Methods: Total of 25 de novo, consecutive, elective stenting lesions (22 patients) were enrolled in this study. OFDI and IVUS images were recorded before intervention. IVUS images were blinded for operators. Stent implantation was performed under OFDI-guidance alone. IVUS confirmation was performed after the procedure and further treatment was permitted based on IVUS results. One-month after the procedures, strategy of stent deployment was re-built by the same operator with the IVUS record before intervention.
Results: Selected stent length and diameter were equal between OFDI-guidance and IVUS-guidance (O;23.8mm vs I;23.3mm,p=0.53, O;3.38mm vs I;3.33mm,p=0.41). The selected landing point difference of OFDI-guidance and IVUS-guidance were 1.8mm at proximal edge and 0.8mm at distal edge. Distal protection device was deployed 4 cases according to OFDI images. Additional inflation was performed after final IVUS in 2 cases. There was no complication (perforation, slow-flow/no-flow, dissection to need additional stenting) during procedure and no in-hospital MACE (death, QMI/nonQMI, subacute stent thrombosis).
Conclusion: OFDI-guidance is comparable to IVUS-guidance for elective stent implantation.

TCTAP A-083

Impact of Diabetes on Heavily Calcified Plaque in Extremely Late In-stent Restenosis Lesions After Bare-metal Stent Implantation

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Background: In-stent neoatherosclerosis is a major concern of late in-stent restenosis after either drug-eluting stent or BMS implantation. Patients with DM increase requiring target lesion revascularization (TLR) at long-term follow-up. The characteristics of lesions with extremely late in-stent restenosis after BMS implantation remain unclear.
Methods: Median follow-up duration after BMS implantation was 10.0±2.8 years (range 4-16 years). Consecutive 35 late in-stent restenosis lesions required the first TLR beyond 4 years after BMS implantation were estimated with IVUS measuring the calcium arc and length.
Results: All patients (67.5±5 y.o.; 28 male) presented ischemic symptoms (18 ACS included 5 STEMI, 17 stable ischemia). All in-stent lesions contained various calcified plaque. The mean calcium arc was 138±100 degree and length 8.2±10 mm respectively. In DM patients, calcium arc was significantly greater than those of non-DM (195±83 vs 83±79 degree; p<0.01). The rate of severely calcified lesion defined as calcium arc over 180 degree was higher in DM than those in non-DM (63.1% vs 12.5%: p<0.01). There was no difference in the period between the index procedure and TLR (DM 9.8±3.0 years, non DM 10.6±2.1 years).
Conclusion: Various calcified plaque are contained in the late in-stent restenosis lesions regardless of DM. However DM is correlated with heavily calcified plaque in the lesions with late in-stent restenosis. We should pay attention to treatment of late in-stent restenosis with DM patients because of existence of heavily calcified plaque.

TCTAP A-084

Impact of Pre-dilatation Strategy on Vessel Response Following Stent Implantation in Patients with De Novo Coronary Artery Lesion

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Background: Although follow-up event rates have significantly improved since the introduction of drug-eluting stents, pre-dilatation strategy before stenting is still important to achieve better stent expansion. The Lacrosse non-slip element (NSE)

balloon is an angioplasty catheter with 3 longitudinal elements that produce 3 endovascular surgical incisions during balloon dilation. The aim of this study was to evaluate plaque modification with NSE compared to those with conventional balloon angioplasty (POBA) using IVUS.
Methods: A total of 62 de novo coronary lesions were enrolled in this study. Patients were divided into 2 groups according to pre-dilatation strategy: NSE (n=32) and POBA (n=30). Volumetric IVUS analyses were performed for before and post-stenting. Volume index (VI: volume/length) was calculated for vessel, lumen, and plaque.
Results: Vessel VI before stenting was similar between the 2 groups. For the post-stenting, vessel and peri-stent plaque VI were significantly smaller in the NSE group compared with the POBA group, while stent VI was similar between the 2 groups. In addition, serum level of creatine kinase and troponin level after stenting was not different between the groups.
Conclusion: Our results demonstrate that plaque modification with NSE before stenting decreased vessel enlargement and increased peri-stent plaque compression without distal embolization compared with POBA, although stent expansion was similar between the 2 groups.

TCTAP A-085

What Stent Diameter Should We Select in Order to Prevent from Stent Edge Dissection in OCT-guide?

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Background: To get better clinical outcome, biggest stent diameter without causing edge dissection should be selected. Optical coherence tomography (OCT) can show the lumen diameter of stent landing zone precisely and also show stent edge dissection clearly. We investigated the stent edge lesion in relation to stent diameter using OCT.
Methods: From July 2012 to August 2013, we investigated 384 stent edge lesions without calcification treated with single 2nd generation drug-eluting stent (DES) under OCT guidance. Before and after deployment of DES with stent delivery balloon by 2 or 3 times inflations, diameter and area ratios of stent edge to reference lumen were analyzed by OCT. We compared these between edge dissection group and no-dissection group.
Results: The overall incidence of edge dissection was 23 lesions (6.0%). Compared with no-dissection group, ratio of stent edge to reference lumen diameter (1.24 vs. 1.12, p<0.001) and area (1.56 vs 1.26, p<0.001) were significantly larger in edge dissection group. Most of reference tissue character in edge dissection group was eccentricity (N=16(69.6%)) and lipid rich plaque (N=15(65.2%)).
Conclusion: We should select optimal stent diameter by up to quarter size-up to reference diameter in order to prevent from stent edge dissection.

TCTAP A-086

Quantitative Comparison of Vessel Dimensions Measured by Optical Coherence Tomography and Intravascular Ultrasound in Coronary Atherosclerotic Plaques

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Background: Optical coherence tomography (OCT) is a novel intracoronary imaging technique with an extremely high resolution, which is inferior to intravascular ultrasound (IVUS) in visualizing adventitia with lipid rich plaque because its drawbacks include a limited tissue penetration. This study compared the findings of OCT and IVUS used for the in vivo assessment of coronary lesions with lipid rich plaque.
Methods: We enrolled 80 segments with lipid rich plaque of 80 stable angina patients that were performed by both OCT and IVUS. The segments were classified into four groups according to the degree of lipid arc measured by OCT (group1: lipid arc <90, group2: 90≤ <180, group3: 180≤ <270 and group4: 270≤). The parameters (luminal area (LA), external elastic membrane (EEM), Plaque plus media (P&M) calculated as LA subtracted from EEM), which have been evaluated independently by OCT and IVUS for all segments, were analyzed by using Spearman correlations and Bland-Altman plots.
Results: 80 segments were classified as: group1 (n=12), group2 (n=23), group3 (n=28) and group4 (n=17). Between OCT and IVUS, there were high correlations in all groups of LA (group 1, 2, 3 and 4: Spearman correlation coefficient, r=0.976, 0.983, 0.963 and 0.989, respectively; all p<0.001) and EEM (r=0.978, 0.917, 0.831 and 0.663; p<0.001, <0.001, <0.001 and =0.003, respectively). There were significant correlations between OCT and IVUS measurements in group 1, 2 and 3 of P&M, while there was not significant correlation in group 4 of P&M (group1, 2, 3 and 4: r=0.711, 0.767, 0.626 and 0.308; p=0.008, <0.001, <0.001 and 0.233, respectively). The Bland-Altman plots indicated no evidence of systemic bias in all groups of LA (group1, 2, 3 and 4: 95% confidence interval(CI) = -1.3 to 0.7, –1.2 to 0.4, -1.4 to 0.9, -1.1 to 0.5 mm^2, respectively), EEM (95% CI= -1.5 to 1.1, -3.2 to 2.6, -5.2 to 3.2, -9.2 to 4.9 mm^2, respectively) and P&M (95% CI= -1.1 to 1.3, -2.8 to 3.1, -5.1 to 3.5, -9.1 to 5.4 mm^2, respectively).
Conclusion: OCT might be feasible for quantitative measurements of vessel size in the lesion with the lipid arc of ≤ 3 quarters.

Left Atrial Appendage Closure (TCTAP A-087)

TCTAP A-087

Percutaneous Left Atrial Appendage Occlusion Can Be Performed Under Conscious Sedation Without General Anaesthesia

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Background: Percutaneous left atrial appendage occlusion (LAAO) procedure is typically performed with transesophageal echocardiography (TEE) guidance under general anaesthesia (GA). Whether the complexity of this procedure can be reduced by performing under conscious sedation (CS) instead of GA has not been studied.
Methods: The feasibility and safety of performing LAAO procedures in 8 patients (4 men, mean age 67±10) under CS with intravenous Midazolam±Fentanyl was studied. TEE was used to guide transseptal puncture and implantation of LAAO devices. Patients' haemodynamic conditions and oximetry were monitored closely during the procedures
Results: All patients underwent LAAO procedures successfully with CS. The procedural duration and fluoroscopic time were 98.6±27.1 and 14.4±5.2 minutes respectively. The doses of Midazolam and Fentanyl required were 5.7±2.0mg and 56.3±32μg respectively. There was no complications arising from the use of CS. Watchman and Amplatza Cardiac Plug (ACP) devices were implanted in 5 and 3 patients respectively with a mean size of 27.6±5.2mm. One patient had minor migration of ACP device on day one routine TEE surveillance. The device was successfully retrieved percutaneously and the patient was free from any long-term sequelae. With a median follow-up of 15.5 months, warfarin could be successfully stopped in all patients and no thromboembolic complications have been observed.
Conclusion: LAAO procedure can be performed under CS safely. This approach will significantly reduce the complexity of this increasingly performed procedure.

Non-Invasive Cardiac Imaging: CTA, MRI, 3D-Echo, and Other (TCTAP A-088 to TCTAP A-092)

TCTAP A-088

Validation of Stress Myocardial Perfusion Computed Tomography in Patients with Suspected Coronary Artery Disease Using Fractional Flow Reserve: Visual Assessment and Exploration of Quantitative Parameters

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Background: To assess the diagnostic accuracy of stress-induced computed tomography myocardial perfusion imaging (CTP) in patients with coronary artery disease (CAD). There was lack of data on the validity of CTP for diagnosing CAD.
Methods: From 197 patients with suspected CAD receiving CTP using second generation dual-source CT, 75 who underwent coronary angiography and fractional flow reserve (FFR) for 210 epicardial arteries were selected for analysis. The diagnostic accuracy of visual and quantitative CTP analyses including transmural perfusion ratio (TPR), myocardial density, and myocardial perfusion reserve index (CT